TROPICAL RAINFALL MEASURING MISSION

November 15, 1999 - November 21, 1999
DOY 319 - 325
Day of Mission 718 - 724

TRMM MISSION OPERATIONS

- TRMM is flying in the -X Forward direction as of 99-313, at 21:42:52z.
- The next Yaw maneuver is scheduled for December 10th (99-344)
- Delta-V maneuver #140 is scheduled for November 22nd (99-326) using the ISP thrusters.
- The Beta angle range for 99-326 to 332 is -50.8° to -48.8°, peaking at -55.63° on 99-329.

TRMM SUBSYSTEM OPERATIONS

Attitude Control System (ACS)

Delta-V maneuver #138 was successfully conducted on 99-320 at 16:21:18z and 17:07:07z, for durations of 45.375 and 29.0 seconds respectively, using the ISP thrusters. The off-modulation of the -Pitch thruster (#6) for burn 1 and 2 was 34.7% and 37.9% (65.3% and 62.1% on time). The remaining fuel is 666.419 kg, and the final apogee and perigee height is 354.90 km x 347.48 km.

Delta-V maneuver #139 was successfully conducted on 99-323 at 15:55:03z and 16:40:52z, for durations of 44.125 and 28.0 seconds respectively, using the ISP thrusters. The off-modulation of the -Pitch thruster (#6) for burn 1 and 2 was 34.8% and 36.2% (65.2% and 63.8% on time). The remaining fuel is 664.739 kg, and the final apogee and perigee height is 354.81 km x 347.50 km.

The ESA experienced Moon interference in quadrants 1 and 3 from 99-319 through 99-321, Sun interference in quadrants 1 and 3 from 99-321 through 99-325, and alternating Sun and Moon interference in quadrants 1 and 3 on 99-325. ACS performed nominally during the transitions between 3 and 4 head control.

On 99-319, the ACS Solar Array Jitter patch was successfully installed into RAM during orbit eclipse at 13:29:44z. ACS Memory Dwell was turned on first during the 12:30z event to monitor the installation process, and the solar array behavior was observed and trended during the next several orbit daylight periods, as well as during the 99-320 Delta-V maneuver. The TRMM solar arrays now track the Sun based on the nominal ephemeris-based TRMM and Sun positions, and the unfiltered ACS gyro data is no longer used. As expected, the amount of variation with the commanded solar array velocities has been reduced from 3 to 6 degrees per minute to about 4 to 5 degrees per minute. Once the patch has been verified during the next high beta angle period, a date will be set for early 2000 to copy the code from RAM to EEPROM.

One unexpected outcome from the new Jitter patch was the appearance of spikes in the -Y solar array commanded velocities after orbit noon, above the new smaller velocity range, which in the past were hidden within the nominal velocity noise levels. It has been possible to regressively determine the presence of this phenomenon since launch, by calculating the difference between

the -Y and +Y solar array velocities which normally coincide exactly, thereby eliminating the possibility of this being related to the new patch.

Another unexpected observation after the patch installation was a slight increase in roll gyro rate levels around the same orbit noon period. Although this Jitter profile is now slightly larger than in the past at lower beta angles, the levels remain constant. The yaw gyro levels did slightly decrease as expected. The solar beta angle cycle peaks at -55.6° on 99-239, which should be high enough to observe any increase in these rate errors resulting from the jitter phenomenon. A secondary data storage filter table will be used during this peak period to observe select attitude telemetry at an 8hz sampling rate. It should be noted that attitude pointing (and therefore science data quality) has never been affected by this phenomenon, since gyro data is filtered before it is used by the reaction wheels and for attitude control.

Flight Data System (FDS)/Command & Data Handling (C&DH)

The frequency standard continues to drift in the negative direction. The frequency standard offset is currently set to x'76F' with a current drift rate of -4.3 µs/hr. The current UTCF value is 31535996.855437 sec with a current drift value of -712 µs.

Q-Channel restarts occurred on 99-322 at 21:25:21z and 99-325 at 11:19:03z.

An EDAC multi-bit error occurred on 99-320 at 21:15:48z

An Invalid Stream Id from XI message (resulting from TMI) was received on 99-325 at 19:41:37z.

Reaction Control Subsystem (RCS)

The RCS subsystem performed nominally during this period. See the ACS section for specific Delta-V information.

Power Subsystem

The Power subsystem is operating nominally.

Electrical Subsystem

The Electrical subsystem operated nominally during this period.

Thermal Subsystem

The Thermal subsystem operated nominally during this period.

Deployables Subsystem

The Deployables subsystem performed nominally during this period.

RF/Communications Subsystem

The RF/Communications subsystem performed nominally during this period.

SPACECRAFT INSTRUMENTS

CERES

The CCR which involves creating and testing TSMs to monitor the CERES current is expected to be closed out by the end of the year. A walk-through is being planned in December for the removal of CERES from load-shed plan and the test results.

Currently plans are to resume operations once the TERRA spacecraft has completed checkout in January 2000. There are no plans to manually remove power from the instrument once operations have resumed.

LIS

LIS performed nominally during this time period. The Heater Auto Select remains disabled pending further MSFC analysis.

PR

PR performed nominally during this time period. The list of Internal Calibration times over Australia in which PR was not radiating is listed below:

1999/319:00:27:24 - 00:29:31z
1999/319:23:15:55 - 23:18:06z
1999/320:15:34:36 - 15:38:10z
1999/320:22:04:13 - 22:05:40z
1999/320:23:38:18 - 23:40:26z
1999/322:14:44:53 - 14:49:57z
1999/322:22:50:15 - 22:51:47z
1999/323:21:38:00 - 21:40:10z
1999/324:13:56:22 - 14:00:00z
1999/324:20:26:44 - 20:28:58z
1999/325:20:49:20 - 20:51:26z

TMI

TMI performed nominally during this time period.

VIRS

VIRS performed nominally during this time period.

1999 LEONID STORM ACTIVITIES

No anomalous behavior was detected on any subsystem resulting from the Leonid Meteor storm. The TRMM Leonid timeline of events was successfully conducted and there were no problems with any of the instrument shut-downs or turn-ons.

ACS FDC System Tables 106 and 107 and SC TSM System Table 20 were dumped and verified on 99-320 at 14:36z as one of the contingency preparation steps for the 1999 Leonid Meteor storm.
In addition, all contingency and instrument configuration procedures were tested with the STTF dynamic simulator prior to the storm. The FOT utilized the FDF website which contained the Leonid entry/exit exposure times reports, and regular MSFC e-mail updates were referenced to determine the changes in the Zenith Hourly Rate of the storm.

Below are the instrument off and on times. Please reference the attached Leonid Completed Timeline for the complete listing of all the activities and their corresponding times.

TMI OFF:	99-321 at 19:57:28z	TMI ON:	99-322 at 06:44:47z
PR OFF:	99-321 at 19:58:45z	PR ON:	99-322 at 08:18:14z
LIS OFF:	99-321 at 21:25:27z	LIS ON:	99-322 at 06:53:28z
VIRS OFF:	99-321 at 21:28:07z	VIRS ON:	99-322 at 06:50:47z

No VIRS Outgas operations were not performed based on VIRS personnel request, although outgassing may be conducted next week to minimize the inner stage temperature.

GROUND SYSTEM

The new release 8.1 will be delivered to String 3 on November 22. All Y2K rollover testing has been completed on String 3, which is now awaiting final system cleanup. String 3 Release 8.1 FOT operational readiness testing will begin on November 29 and is expected to last for approximately 1-2 weeks. String 2 remains the prime Mission Planning string.

Following the reacquisition for the 99-319 04:44z daily coherency switch, one 2hz ACE A RSD packet was partially cut off and was not completely decommutated on the FEP (ER #141). There was no impact to operations.

TR1WS1 crashed on 99-320 at 07:44 (ER #142). A workstation and FEP reboot were performed and the problem did not occur again.

Event Reports

ER #141: One Packet not fully decommutated following COHO switch. See Ground System section.

ER #142: TR1WS1 crashed on 99-320 at 07:44z. See Ground System section.

Generic Late Acquisition Reports (for TTRs 19639)

No new Late Acquisition Reports were opened during this week.

New Anomaly

No new Anomaly Reports were opened during this week.

Recurring Open Anomalies

No recurring anomalies were seen during this period.

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